Project Achievements

Two years after reconstruction

DEQ and NRDP have only begun remediation and restoration of Silver Bow Creek, and significant improvements have occured in the ecosystem including:

Improved Water Quality - The quality of both surface water and groundwater within the area has improved greatly compared to preconstruction levels. Upstream cleanup work in Butte is responsible for much of the improvement in the stream quality; however, it is imperative that comprehensive cleanup occurs in the Butte Priority Soils Operable Unit (BPSOU) to protect work along Silver Bow Creek. An EPA plan for the BPSOU will be issued this summer or fall. Recent sampling of Silver Bow Creek found no metals concentrations above drinking water standards and metals concentrations much closer to meeting aquatic life standards than prior to construction.

Better Biological Diversity - Biological indicators such as aquatic insect diversity already show improvement from cleanup efforts completed at the site. Algal composition has also changed since remedial actions have begun, with a greater presence of species that are sensitive to metals.

Successful Revegetation - Through replacement of tailings and contaminated soils in the floodplain of upper Silver Bow Creek with clean material and organic matter, revegetation efforts have been successful. Wicking of metallic salts to the ground surface, common in the area previously, has been reduced. Grasses and forbs are well established through much of the remediated area, and the enhanced shrub and tree plantings resulting from activities funded by Restoration Grants are exhibiting a high survival rate. As the construction workers have revegetated the area, they have implemented an aggressive weed management program to prevent invasion of weeds.

Stabilized Stream Channel - The new stream channel constructed in the upper reaches of Silver Bow Creek has successfully weathered high flows, and vegetation is well established on its banks. Pools and other habitat features added by restoration funding are functioning as designed and providing increased aquatic habitat diversity.

Administrative Success - The State of Montana has shown that it can manage both remedy and restoration activities as one, integrated project and still maintain clear distinctions between the funding sources for accounting purposes.

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Remediation and Restoration of Silver Bow Creek
A Superfund Success Story

Spring 2003

The cleanup of Silver Bow Creek has been ongoing since 1999 as part of a Superfund remedial action being coordinated by the Montana Department of Environmental Quality (DEQ) in consultation with the U.S. Environmental Protection Agency (EPA). In 2000, the Natural Resource Damage Program (NRDP) of the Montana Department of Justice formed a partnership with DEQ, bringing a restoration component to the project that goes beyond remediation required under Superfund. In this brochure, we provide a brief history of the project, updates regarding the current status of the project, and descriptions of activities contemplated at the site over the next decade.

PROJECT BACKGROUND

The Problem

Silver Bow Creek extends from Butte approximately 23 miles to the Warm Springs Ponds, a treatment facility located near the headwaters of the Clark Fork River (see map). Since the late 1800s, tailings and other mine wastes containing elevated concentrations of metals have been discharged to or otherwise entered Silver Bow Creek. These toxic discharges produced a metals-impacted floodplain and streambed sediments and virtually eliminated aquatic life in the stream. Tailings deposited in the floodplain are toxic to plants and have resulted in a floodplain that is largely devoid of vegetation and is largely incapable of supporting wildlife.

The Remedial Response

In 1983, EPA listed the Silver Bow Creek/Butte area as one of multiple Superfund sites in the Upper Clark Fork River Basin. The agency later designated approximately 23 stream miles of Silver Bow Creek as an operable unit (OU) within this overall Superfund site. The Streamside Tailings Operable Unit (SSTOU) has become one of the areas of focus for Superfund cleanup in the Butte area. Initially, EPA named ARCO as the primary party responsible for remediation of the SSTOU and other Superfund sites in the Upper Clark Fork Basin through its acquisition of the Anaconda Company. EPA and DEQ issued a Record of Decision (ROD) for the site in November 1995 that identifies the final site remedy and the agencies' rationale for selecting that remedy. The major remedial action that resulted from issuance of the ROD is excavation of tailings and related impacted soils from the floodplain of Silver Bow Creek and reconstruction of the stream channel and floodplain. For planning purposes, the SSTOU was divided into four subareas (Subareas 1 - 4), each with a distinct geologic and geographic character (see map).

The NRDP Connection

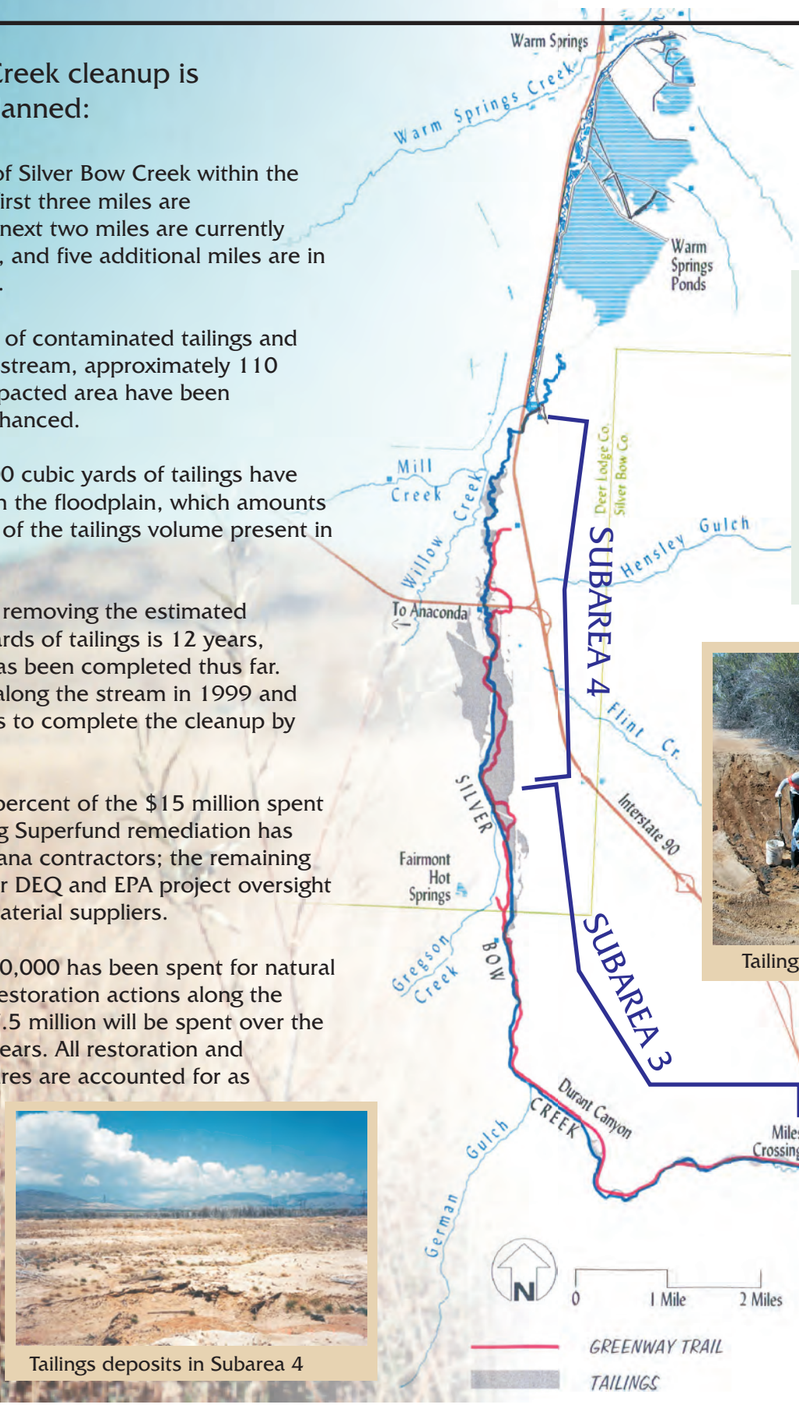
In a 1999 state, federal and tribal settlement, ARCO agreed to pay $215 million to the State to resolve certain claims. From the settlement amount, $80 million plus interest was set aside for DEQ and EPA to implement the remedy for Silver Bow Creek. Some of the remaining amount is being used to enhance the cleanup of Silver Bow Creek through various habitat improvements and restoration actions. DEQ and EPA are coordinating the cleanup of the Silver Bow Creek remedy with NRDP.


Reconstructed Silver Bow Creek, Mile 1, October 2002

Project Status Today

The Silver Bow Creek cleanup is proceeding as planned:

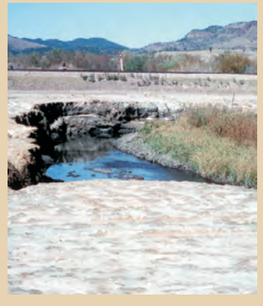
- Of the 22.6 miles of Silver Bow Creek within the operable unit, the first three miles are reconstructed, the next two miles are currently under construction, and five additional miles are in the design process.
- Of the 1,400 acres of contaminated tailings and soils alongside the stream, approximately 110 acres of tailings impacted area have been remediated and enhanced.
- So far, over 650,000 cubic yards of tailings have been removed from the floodplain, which amounts to over 16 percent of the tailings volume present in the entire site.
- The time frame for removing the estimated 4,000,000 cubic yards of tailings is 12 years, inclusive of what has been completed thus far. DEQ started work along the stream in 1999 and expects contractors to complete the cleanup by 2010.
- Approximately 95 percent of the $15 million spent so far in completing Superfund remediation has been paid to Montana contractors; the remaining funds have been for DEQ and EPA project oversight and out-of-state material suppliers.
- To date, about $500,000 has been spent for natural resource damage restoration actions along the stream; another $7.5 million will be spent over the next two to three years. All restoration and remedial expenditures are accounted for as separate funds.



Tailings deposits in Subarea 4


Aerial view of Greenway


Tailings in Subarea 2


Metallic salts in Subarea 2

The Silver Bow Creek Greenway

In 1996, the Greenway Service District was formed. In 1998, the District released its Preliminary Design Report for construction of a greenway corridor along the entire 22 plus miles of Silver Bow Creek. This plan was developed with input from many groups and hundreds of citizens from Anaconda-Deer Lodge and Butte-Silver Bow counties. The estimated cost for development of the entire Greenway Corridor is $18 million.

Since 2000, the governor of Montana approved three Greenway Service District grant applications, totaling nearly $8 million. The major goals of the Greenway Service District are to:

- Restore aquatic, riparian/wetland, and upland ecosystems within the Silver Bow Creek corridor;
- Implement remediation activities under Superfund and restoration activities under NRD grants as one project; and,
- Acquire and provide public access to a passive recreational corridor along Silver Bow Creek.

The major Greenway restoration activities for 2000, 2001, and 2002 grants fall in the following categories:

Trail Construction A trail will be paved along the first five miles and graveled along miles six and seven. In addition to construction of the trail, rest areas will be installed, improvements will be made to railroad bridges to provide trail access, and stream crossings will be constructed. The cost for these community access features, which will replace lost recreational services in a way that will protect natural resources and cleanup, is estimated at $2.2 million.

Floodplain Revegetation Enhancements Several features will be installed along the upper seven miles of the stream to enhance the ecological character of the area. These activities will include organic matter placement on the floodplain, wetland construction, and planting of trees and shrubs throughout the floodplain. These efforts are estimated to cost $1.8 million. Additional floodplain revegetation efforts will enhance remedial efforts already completed at the site and will help to restore severely injured wildlife habitat along the corridor.

Ramsay Flats Tailings Removal Beyond the remedy identified under Superfund in the Silver Bow Creek Record of Decision, it is proposed to remove tailings on approximately 100 additional acres of Ramsay Flats. Removal of all tailings in this area will allow development of a naturally functioning stream and floodplain system. Tailings removal in this area is slated to occur in 2003 and 2004 and will cost approximately $2.7 million.

Aquatic Habitat Enhancements Aquatic habitat will be enhanced by constructing a stream that exhibits a higher channel sinuosity, installing a series of pools, varying stream widths, and placing logs at key locations in the stream. These features will not only augment remedial actions but will also enhance the recovery of aquatic resources to a near pre-disturbance condition. Expenses for these aquatic enhancements are estimated to be $650,000.

Montana Natural Resource Damage Program

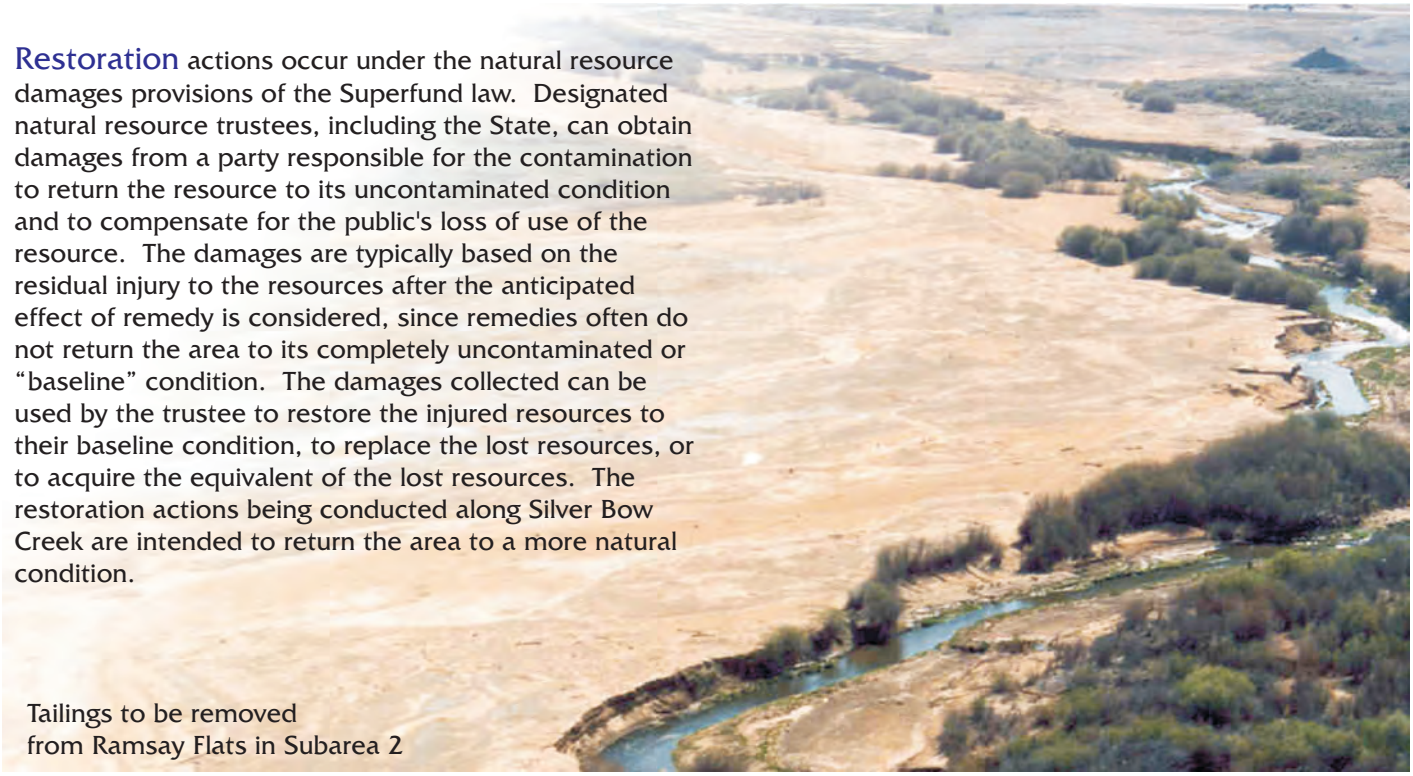
New planting along a reconstructed streambank

The state of Montana obtained approximately $130 million for restoration of injured natural resources in the Upper Clark Fork River Basin (UCFRB) through a partial settlement of its natural resource damage lawsuit against ARCO in 1999. In February 2000, the state released the UCFRB Restoration Plan Procedures and Criteria document that provides the framework for expending these restoration funds. Criteria in this document are directed toward funding the best mix of projects that will restore or replace natural resources that were injured and/or services provided by those resources that were lost due to releases of metals and other hazardous substances from ARCO and its predecessors' mining and mineral processing operations in the UCFRB. The Montana NRDP administers the UCFRB Restoration Grant process and receives annual grant applications. In January 2003, the state began its fourth grant cycle.

REMEDIATION vs. RESTORATION What's the Difference?

Remediation is performed in accordance with the remedy selection provisions of the Superfund law. Remediation actions address the contamination in a manner that eliminates the most direct threats to human health and the environment. Remedies are performed in accordance with specific legal requirements that set "cleanup levels," such as water quality standards, or that require actions to be conducted in a certain manner, such as mine reclamation laws.

Restoration actions occur under the natural resource damages provisions of the Superfund law. Designated natural resource trustees, including the State, can obtain damages from a party responsible for the contamination to return the resource to its uncontaminated condition and to compensate for the public's loss of use of the resource. The damages are typically based on the residual injury to the resources after the anticipated effect of remedy is considered, since remedies often do not return the area to its completely uncontaminated or "baseline" condition. The damages collected can be used by the trustee to restore the injured resources to their baseline condition, to replace the lost resources, or to acquire the equivalent of the lost resources. The restoration actions being conducted along Silver Bow Creek are intended to return the area to a more natural condition.

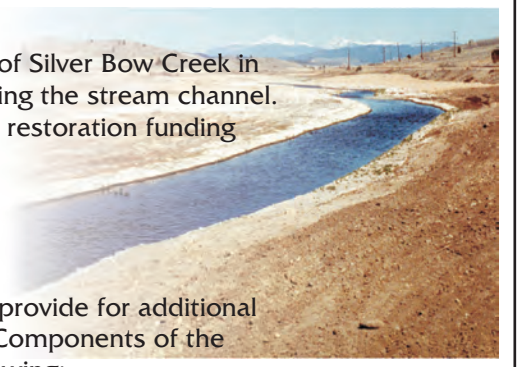


Tailings to be removed
from Ramsay Flats in Subarea 2

Remedial and Restoration Actions to Date

Below is a brief summary of remedial and restoration actions in Subarea 1 (the upper five miles) of Silver Bow Creek. ARCO, under EPA direction, led previous efforts to clean up some waste areas above the upper end of the SSTOU, including the historic Colorado Tailings area, and those activities will continue as part of the Butte Priority Soils Operable Unit remedy.

1999-2000, First Mile of Stream



DEQ initiated cleanup activities (called remedial actions) at the upper end of Silver Bow Creek in 1999 by removing streamside tailings to a local repository and reconstructing the stream channel. Revegetation was also planned for this section using both remediation and restoration funding sources.

2001-2002, Miles 2 & 3 of the Stream

DEQ modified remediation plans for the next two miles of construction to provide for additional benefits, partially made possible by the availability of Restoration Grants. Components of the project of particular note during this construction season included the following:

- Contractors loaded tailings on train cars for transport to a regional repository at the Opportunity Ponds near Anaconda, simplifying long-term waste management challenges and providing cost savings.
- Using Restoration Grants, contractors planted denser stands of willows on streambanks and a greater number of trees, shrubs, and grass plugs over a wider area in the floodplain.
- NRDP funded the Greenway Trail which was integrated into the overall Superfund project (see related story).

2002-2003, Miles 4 & 5 of the Stream

Continuing downstream, project contractors are reconstructing the stream in the lower two miles of Subarea 1. In addition to designing features that appeared in prior years, project engineers added restoration elements in this section of the stream that enhanced fishery habitat, including increased pool density and logs placed along the banks and in the bed of the stream.

Subarea 2 - Current Design

DEQ and NRDP personnel and their contractors are currently preparing design plans for remediating Subarea 2, the portion of Silver Bow Creek stretching from the town of Silver Bow to near the head of Durant Canyon (see map). A substantial amount of work has been accomplished, including:

- Contractors excavated 700 test pits during the summer of 2002 in this 340-acre area to characterize 1.6 million cubic yards of contaminants at the site.
- Project engineers identified near-by borrow areas to obtain clean backfill material.
- The 2002 Greenway grant approval enables DEQ to remove the entire Ramsay Flats tailings deposit, allowing establishment of a more natural stream channel and floodplain as well as providing a more permanent remedy.
- Project engineers and ecologists completed a channel stability analysis and conceptual design of Silver Bow Creek in Subarea 2 to evaluate the existing stream condition and additional restoration elements needed to provide a more natural, longer, and more stable channel in this reach of the stream.
- Engineers designed a finer-grained, typical bed material for the streambed that allows a more diverse aquatic habitat, and up to 30 acres of open water wetlands to provide more waterfowl habitat.